Diencephalon

- Thalamus
  - Gateway for sensory impulses heading to cerebral cortex
  - Receives all sensory impulses (except smell)
  - Channels impulses to appropriate part of cerebral cortex for interpretation
- Hypothalamus
  - Maintains homeostasis by regulating visceral activities
  - Links nervous and endocrine systems (hence some say the neuroendocrine system

Diencephalon

The Limbic System

- Consists of:
  - Portions of frontal lobe
  - Portions of temporal lobe
  - Hypothalamus
  - Thalamus
  - Basal nuclei
  - Other deep nuclei
- Functions:
  - Controls emotions
  - Produces feelings
  - Interprets sensory impulses

Brainstem

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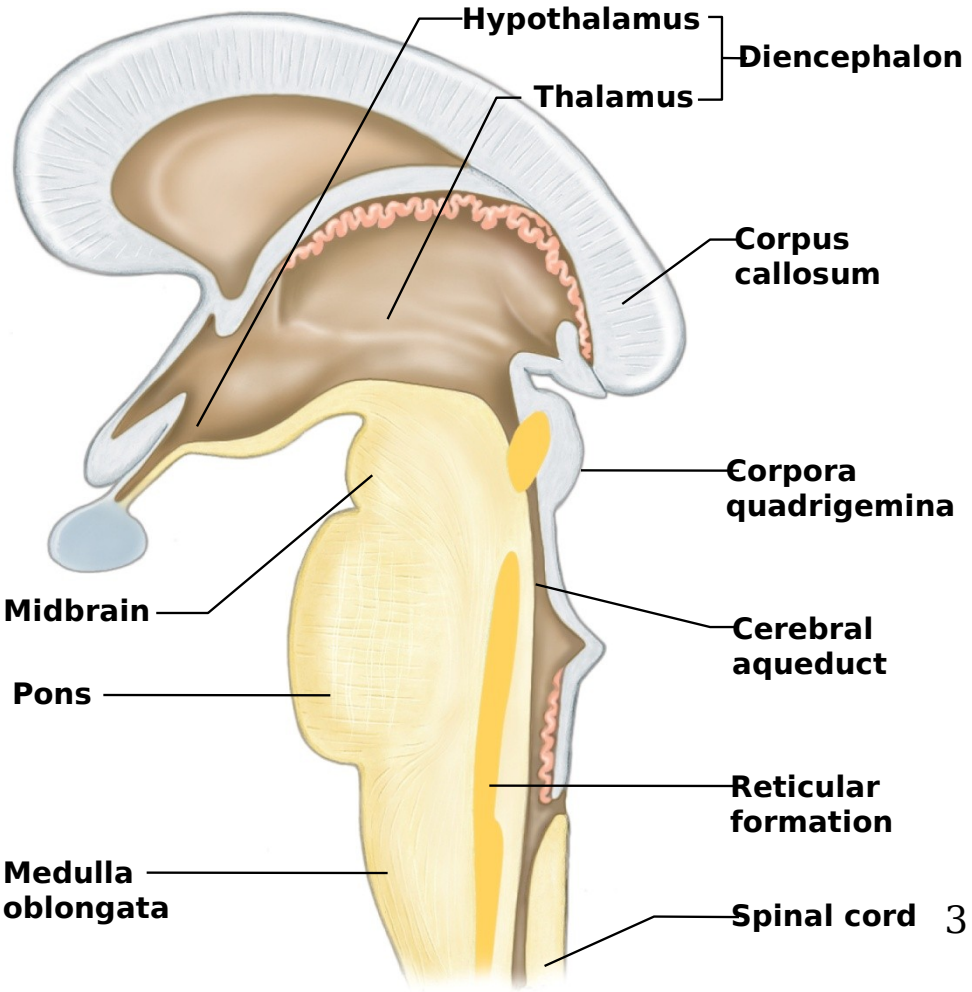
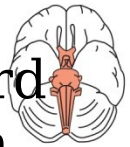
Three parts:

1. Midbrain
2. Pons
3. Medulla Oblongat



Midbrain

- Between diencephalon and pons
- Contains bundles of fibers that join lower parts of brainstem and spinal cord with higher part of brain
- Cerebral aqueduct
- Cerebral peduncles (bundles of nerve fibers)
- Corpora quadrigemina (centers for visual and auditory reflexes)



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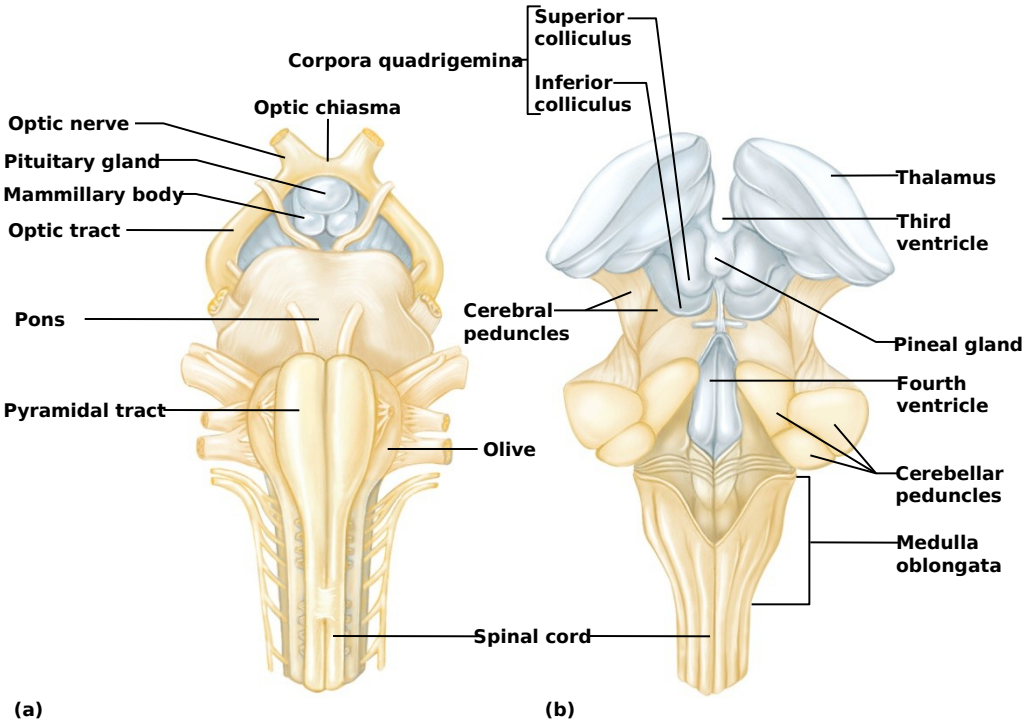
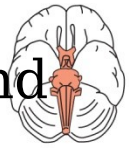


Pons

- Rounded bulge on underside of brainstem
- Between medulla oblongata and midbrain
- Helps regulate rate and depth of breathing
- Relays nerve impulses to and from medulla oblongata and cerebellum



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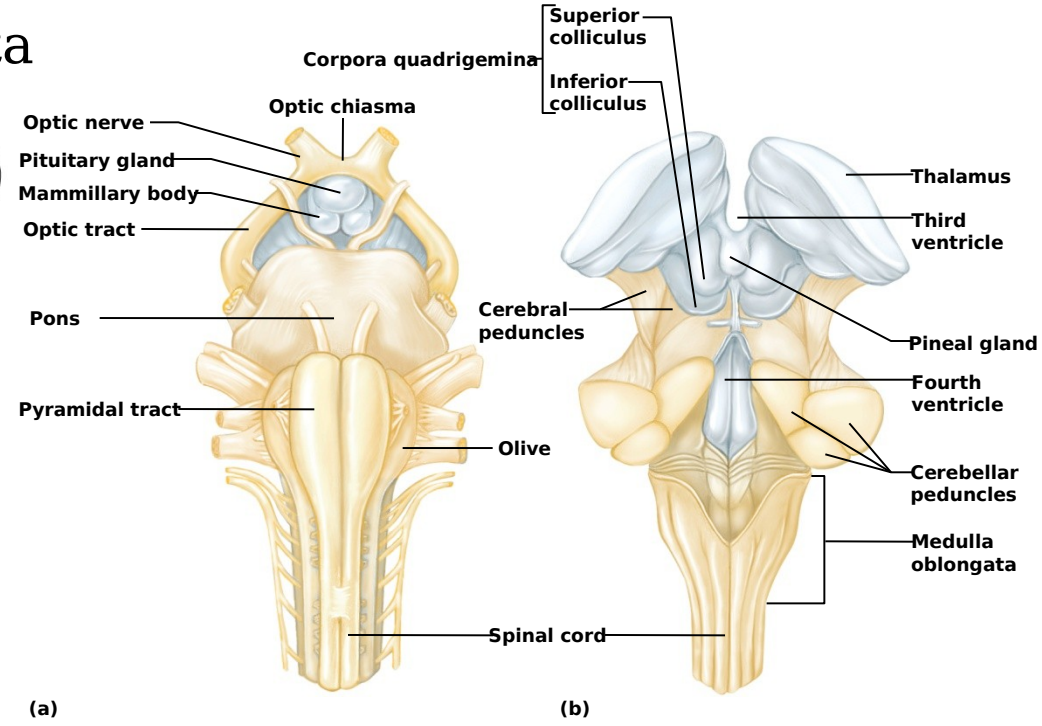

Medulla Oblongata

- Enlarged continuation of spinal cord
- Conducts ascending and descending impulses between brain and spinal cord
- Contains cardiac, vasomotor, and respiratory control centers
- Contains various nonvital reflex control centers (coughing, sneezing, swallowing, and vomiting)

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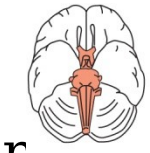

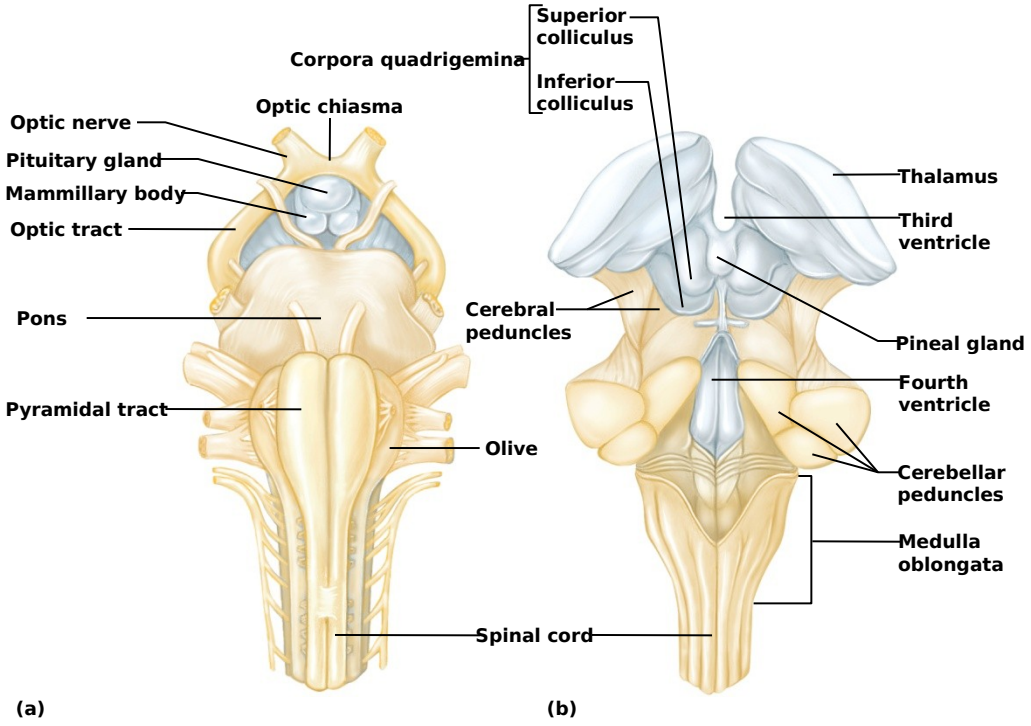

Reticular Formation

- Complex network of nerve fibers scattered throughout the brain ste
- Extends into the diencephalon
- Connects to centers of hypothalamus, basal nuclei, cerebellum, and cerebrum
- Filters incoming sensc information
- Arouses cerebral corte into state of wakefulnes

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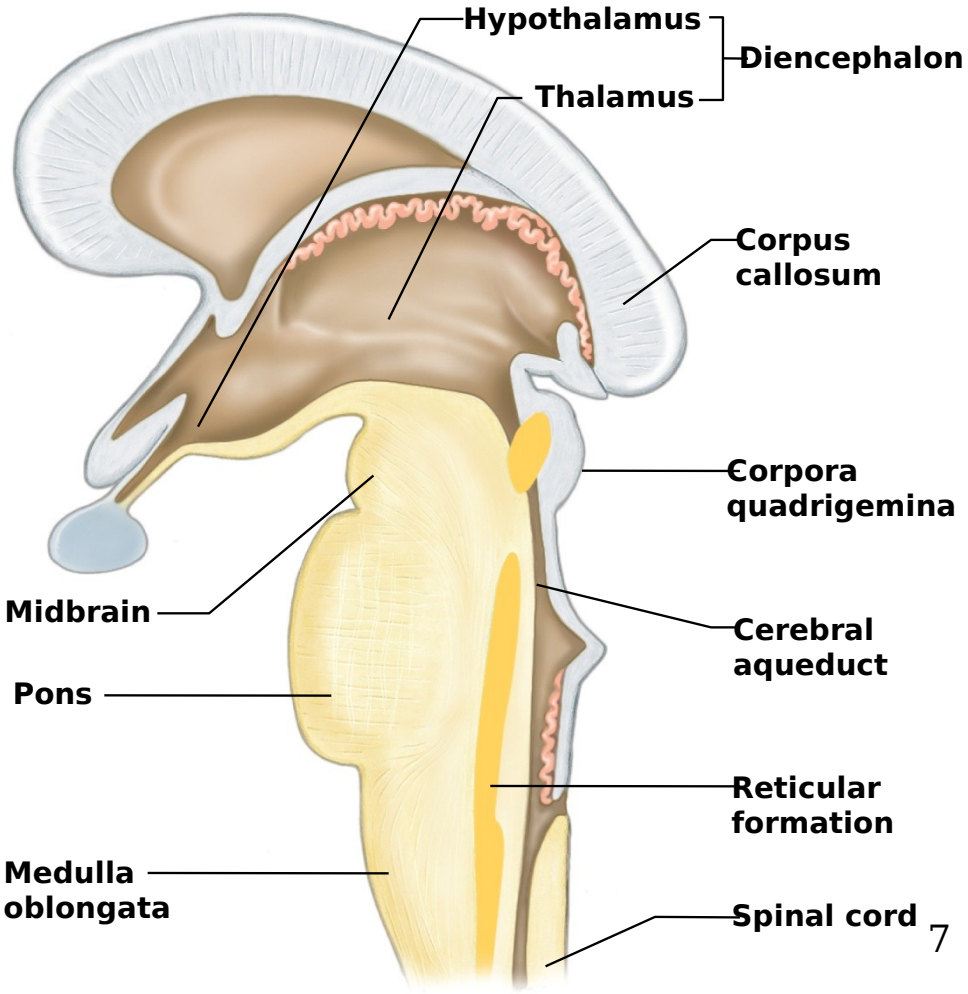

Types of Sleep

- Slow wave
  - Non-REM sleep
  - Person is tired
  - Decreasing activity of reticular system
  - Restful
  - Dreamless
  - Reduced blood pressure and respiratory rate
  - Ranges from light to heavy
  - Alternates with REM
- Rapid Eye Movement (REM)
  - Paradoxical sleep
  - Some areas of brain active
  - Heart and respiratory rates irregular
  - Dreaming occurs

Cerebellum

- Inferior to occipital lobes
- Posterior to pons and medulla oblongata
- Two hemispheres
- Vermis connects hemispheres
- Cerebellar cortex (gray matter)
- Arbor vitae (white matter)
- Cerebellar peduncles (nerve fiber tracts)
- Dentate nucleus (largest nucleus in cerebellum)
- Integrates sensory information concerning position of body parts
- Coordinates skeletal muscle

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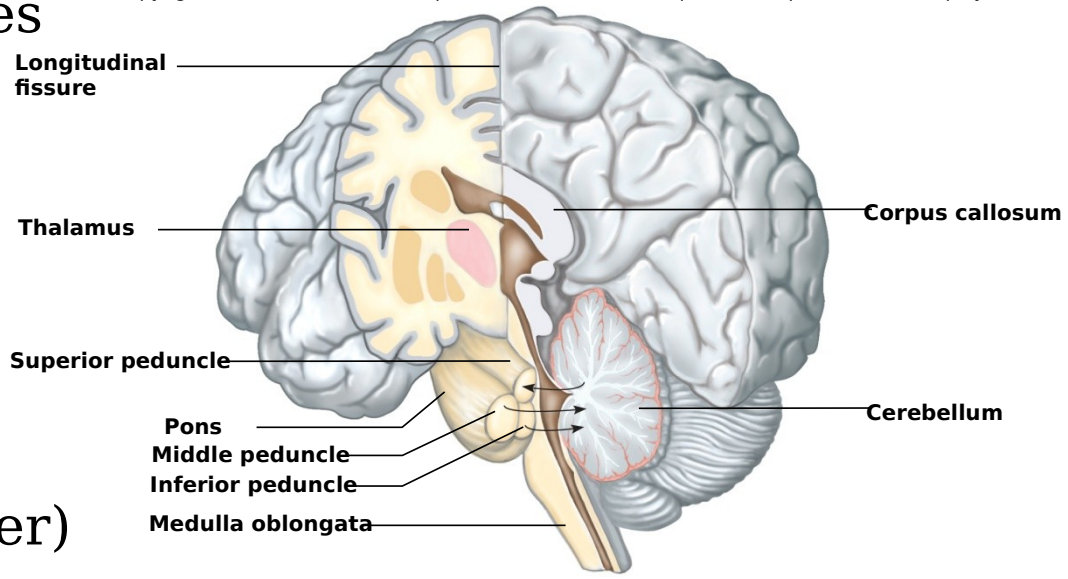

Major Parts of the Brain

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TABLE 11.7 | Major Parts of the Brain

Part	Characteristics	Functions
1. Cerebrum	Largest part of the brain; two hemispheres connected by the corpus callosum	Controls higher brain functions, including interpreting sensory impulses, initiating muscular movements, storing memory, reasoning, and determining intelligence
2. Basal nuclei (ganglia)	Masses of gray matter deep within the cerebral hemispheres	Relay stations for motor impulses originating in the cerebral cortex and passing into the brainstem and spinal cord
3. Diencephalon	Includes masses of gray matter (thalamus and hypothalamus)	The thalamus is a relay station for sensory impulses ascending from other parts of the nervous system to the cerebral cortex; the hypothalamus helps maintain homeostasis by regulating visceral activities and by linking the nervous and endocrine systems
4. Brainstem	Connects the cerebrum to the spinal cord	
a. Midbrain	Contains masses of gray matter and bundles of nerve fibers that join the spinal cord to higher regions of the brain	Contains reflex centers that move the eyes and head, and maintains posture
b. Pons	A bulge on the underside of the brainstem that contains masses of gray matter and nerve fibers	Relays nerve impulses to and from the medulla oblongata and cerebrum; helps regulate rate and depth of breathing
c. Medulla oblongata	An enlarged continuation of the spinal cord that extends from the foramen magnum to the pons and contains masses of gray matter and nerve fibers	Conducts ascending and descending impulses between the brain and spinal cord; contains cardiac, vasomotor, and respiratory control centers and various nonvital reflex control centers
5. Cerebellum	A large mass of tissue inferior to the cerebrum and posterior to the brainstem; includes two lateral hemispheres connected by the vermis	Communicates with other parts of the CNS by nerve tracts; integrates sensory information concerning the position of body parts; and coordinates muscle activities and maintains posture

11.6: Peripheral Nervous System

Cranial nerves arising from the brain
- Somatic fibers connecting to the skin and skeletal muscle
- Autonomic fibers connecting to viscera

Spinal nerves arising from the spinal cord
- Somatic fibers connecting to the skin and skeletal muscle
- Autonomic fibers connecting to viscera

Nervous System Subdivisions

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TABLE 11.8 | Subdivisions of the Nervous System

1. Central nervous system (CNS)
a. Brain
b. Spinal cord
2. Peripheral nervous system (PNS)
a. Cranial nerves arising from the brain
(1) Somatic fibers connecting to the skin and skeletal muscles
(2) Autonomic fibers connecting to viscera
b. Spinal nerves arising from the spinal cord
(1) Somatic fibers connecting to the skin and skeletal muscles
(2) Autonomic fibers connecting to viscera